



US006016290A

United States Patent [19]
Chen et al.

[11] Patent Number: **6,016,290**
[45] Date of Patent: **Jan. 18, 2000**

[54] **READ/WRITE HEAD WITH SHIFTED WAVEGUIDE**

[75] Inventors: **Hong Chen, San Jose; Ross W Stovall, Fremont; Carl Carlson, Pleasanton, all of Calif.**

[73] Assignee: **Read-Rite Corporation, Milpitas, Calif.**

[21] Appl. No.: **09/248,766**

[22] Filed: **Feb. 12, 1999**

[51] Int. Cl.⁷ **G11B 11/00; G11B 5/39**

[52] U.S. Cl. **369/13, 360/113**

[58] Field of Search **369/13, 44.15, 369/44.16, 44.17, 44.18; 360/113, 110, 119, 120, 122, 125, 126, 114, 55, 59**

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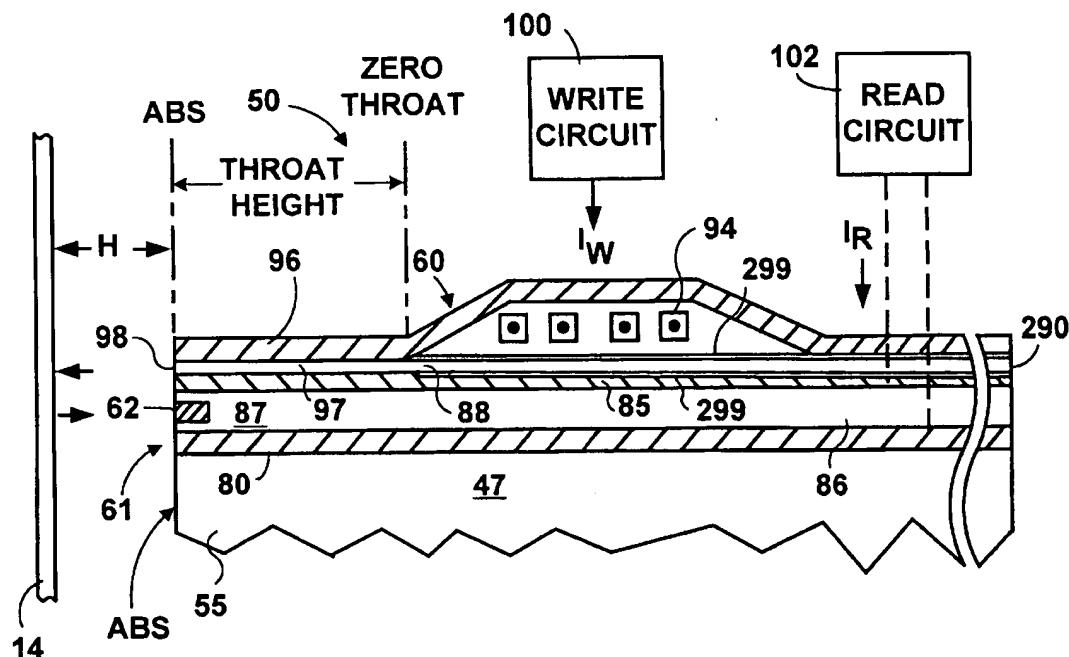
Primary Examiner—Ali Neyzari

Attorney, Agent, or Firm—Robert King; Samuel A. Kassatly

[57] **ABSTRACT**

A read/write head for use in data storage drives includes a thermally assisted inductive write section and a magnetic read section to write data onto, and retrieve data from a storage medium. The write section includes a waveguide formed of a core and a surrounding cladding, and positioned between a first write pole and a second write pole, to conduct a laser beam for heating the medium. The second write pole and the optical waveguide core are offset relative to each other at the pole tip, such that they define an overlap region that determines a written track width. The offsetting facilitates manufacturing process since the optical waveguide core and the second write pole can be made wide enough while still defining tracks with a limited width.

27 Claims, 8 Drawing Sheets





US005452272A

United States Patent [19]

Murakami et al.

[11] Patent Number: **5,452,272**
 [45] Date of Patent: **Sep. 19, 1995**

[54] **MAGNETO-OPTICAL RECORDING AND REPRODUCING DEVICE HAVING LIGHT INTERRUPTING FORMING MAIN ROBE AND SIDE ROBE LIGHT BEAM PORTIONS**

[75] Inventors: Yoshiteru Murakami, Nishinomiya; Junsaku Nakajima, Yamatotakada; Akira Takahashi, Nara; Kenji Ohta, Kitakatsuragi, all of Japan

[73] Assignee: **Sharp Kabushiki Kaisha, Osaka, Japan**

[21] Appl. No.: **175,748**

[22] Filed: **Dec. 30, 1993**

[30] **Foreign Application Priority Data**

Jan. 7, 1993 [JP] Japan 5-001380

[51] Int. Cl. 6 **G11B 11/00**
 [52] U.S. Cl. **369/13; 369/288;**
428/694 EC; 360/114

[58] **Field of Search** **369/13, 275.2, 288,**
369/14, 275.3, 110, 116; 360/114, 59, 131;
365/122; 428/694 MM, 694 EC

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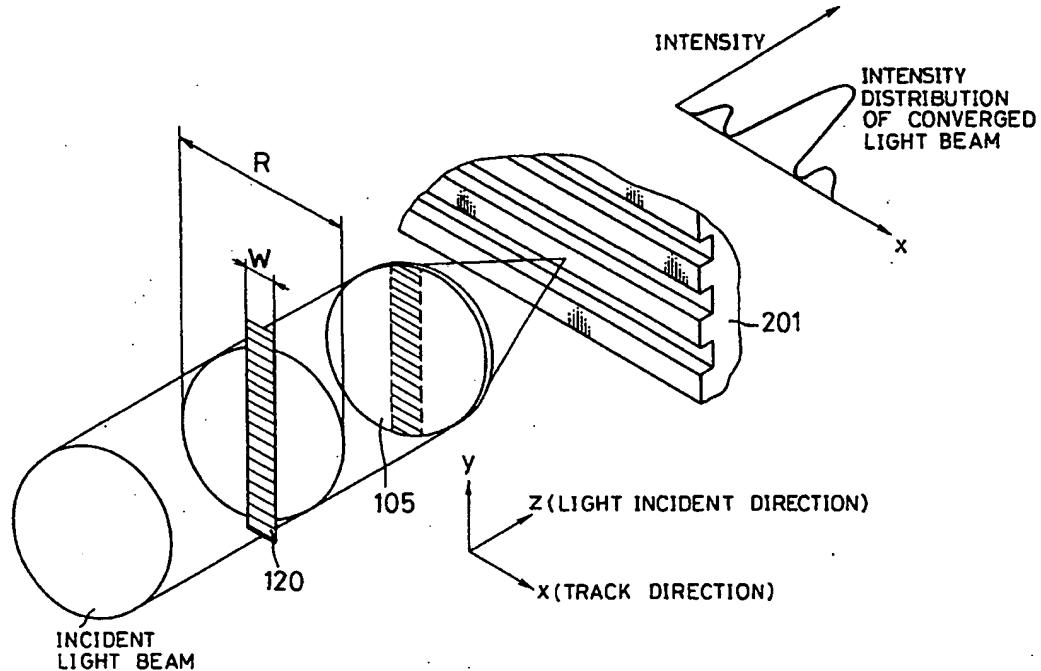
cording International Symposium '91, *J. Magn. Soc. Jpn.*, vol. 115, Supplement No. S1 (1991), pp. 319-322).

Primary Examiner—Ali Neyzari
Attorney, Agent, or Firm—David G. Conlin; Kevin J. Fournier

[57] **ABSTRACT**

A magneto-optical recording and reproducing device is provided with a magneto-optical disk for reproducing recorded information using light, a semiconductor laser, an objective lens for converging a light beam emitted from the semiconductor laser onto the magneto-optical disk and a light interrupting member for interrupting a portion of a light beam before it is incident on the objective lens. The magneto-optical disk is composed of a readout layer which is predominant in in-plane magnetization, and in which a transition occurs to be predominant in perpendicular magnetization as temperature thereof is raised and a recording layer for recording thereon information using a perpendicular magnetization. In this arrangement, since the light interrupting member is provided, a light spot can be made smaller, thereby improving a recording density. Moreover, even when temperature of the readout layer is raised due to a side robe generated by the light interrupting member, in-plane magnetization is maintained in the readout layer. Thus, interference by unwanted reproducing signals due to the side robe can be prevented, thereby improving a reproducing signal quality.

20 Claims, 24 Drawing Sheets





US005966348A

United States Patent [19]
Hashimoto et al.

[11] **Patent Number:** **5,966,348**
[45] **Date of Patent:** **Oct. 12, 1999**

[54] **INFORMATION REPRODUCING METHOD AND APPARATUS FOR REPRODUCING INFORMATION BY MOVING MAGNETIC WALL**

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[75] Inventors: Morimi Hashimoto, Wako; Tsutomu Shiratori, Tokyo, both of Japan

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Primary Examiner—Ali Neyzari
Attorney, Agent, or Firm—Fitzpatrick, Cella, Harper & Scinto

[21] Appl. No.: 08/932,914

ABSTRACT

[22] Filed: Sep. 18, 1997

Method and apparatus for reproducing information by enlarging a magnetic domain on a medium by moving a magnetic wall. The apparatus includes a heating device for partially heating the medium in order to cause movement of the magnetic wall, and a magnetic head for detecting a leakage magnetic field generated in association with movement of the magnetic wall, wherein the information is reproduced on the basis of a detection result of the magnetic head. The medium is made up of a layer in which the magnetic wall moves, an intermediate layer, and a layer in which information is accumulated. The magnetic head is arranged on the layer side where the magnetic wall moves. The heating device is arranged on the side of the layer in which information is accumulated.

Foreign Application Priority Data

Sep. 19, 1996 [JP] Japan 8-248400

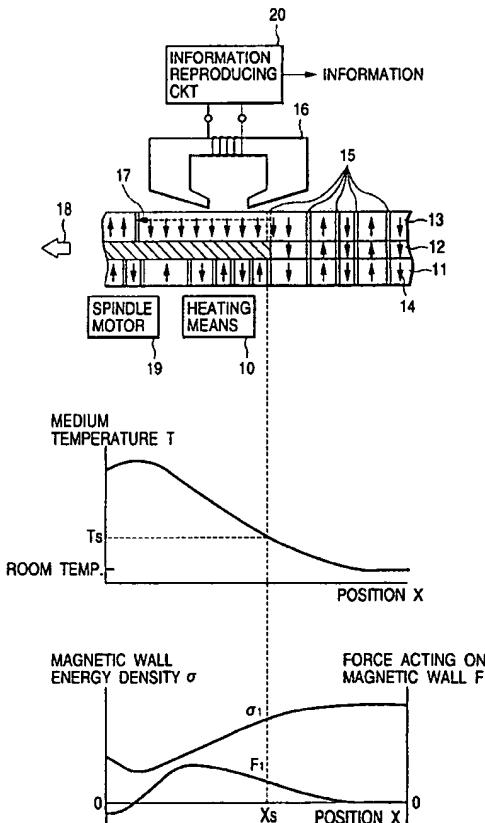
[51] **Int. Cl.⁶** G11B 11/00

[52] **U.S. Cl.** 369/13; 369/47

[58] **Field of Search** 369/13, 14, 116, 369/275.2, 47, 48, 59; 360/114, 59, 110, 113; 428/694 MM, 694 ML, 694 EC, 694 SC

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